

ENERGY: A MAJOR COASTAL ZONE MANAGEMENT ISSUE

By Jane Mead, CZM

When you flip on the light or turn up the thermostat, do you wonder where the energy comes from? With most of our energy sources in Massachusetts coming from out of state, it's an easy question to avoid. Each year, Bay State residents and businesses consume more than one and a half quadrillion Btus of energy. Because so much of the state's raw energy is brought in by ship, many storage and generating facilities have been located on the Commonwealth's coast, which is just one reason energy is a major coastal management issue.

About 15 percent of the state's power is generated from coal and nuclear energy, with two large coal-fired power plants and one nuclear plant in Massachusetts. It is not expected that any new coal or nuclear generating facilities will be built in the foreseeable future.

Right now, renewable energy is a fairly small part of the Massachusetts fuel mix. Hydropower is the major source of homegrown electricity, but is gradually being phased out because of the damage that dams cause to spawning fish. Small projects

and they maintain the transmission systems. Prices that the electric suppliers can charge are unregulated, but retail prices to businesses and homeowners are regulated, though the price of electricity can be raised or lowered in response to market conditions. Other features of the statute require that renewable energy be included in the mix of power sources used by the retail power suppliers.

This structure has led to enormous interest in developing additional generating capacity, as well as renewable sources of energy in Massachusetts. In the past year, about 1,000 MW of new capacity were brought on line, another 6,500 MW have been permitted, and 3,500 MW are under construction and will be on line within the next 2-3 years. To fuel these plants, a high-pressure gas pipeline to bring natural gas from Sable Island, Nova Scotia, is under review. A proposal to develop a 420 MW wind farm in Nantucket Sound is also currently under consideration.

REVIEW: POWER PLANTS AFFECTING THE COASTAL ZONE

The Massachusetts Office of Coastal Zone Management (CZM) has had significant involvement in the review of all new and expanded energy facilities in the coastal zone. Under our federal consistency authority, any project that affects the land or water resources or uses of the Massachusetts coastal zone must be consistent with state coastal policies. Power plants have the potential to affect many coastal resources and CZM review helps to minimize those impacts.

In 1998, four existing coastal generating plants that are within CZM's jurisdiction were purchased from local utilities by large generating companies. Sithe acquired Boston Edison facilities in South Boston on the Reserved Channel, in Everett on the Mystic River, and in Weymouth on the Fore River. No changes were proposed to the South Boston plant, but Sithe wanted

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THE SOURCES: CURRENT AND PROJECTED

About 50 percent of the energy consumed in Massachusetts is developed from petroleum products, pumped from wells in Venezuela and the Middle East and delivered to regional tank farms by ship and barge. At the moment, New England is more heavily dependent on fuel oil for heat than other parts of the country, though this is changing as new sources of natural gas become available.

Natural gas, currently the source of 30 percent of our energy, is mostly piped from the Gulf of Mexico, western Canada, and the Scotian Shelf off the Canadian Maritime Provinces. About 15 percent of the natural gas used in Massachusetts is imported as Liquefied Natural Gas (LNG), primarily from Trinidad. The huge reserves that have been found off the Canadian Maritimes, and the demands of new electrical generating facilities for clean fuel, however, are expected to increase natural gas use in the region. By 2005, it is anticipated that natural gas will be used to generate 45 percent of the region's electricity.

to capture wind and solar power have also been installed in the state, and wind power projects are expected to be proposed in increasing numbers.

ELECTRICITY GENERATION AND DEREGULATION

Massachusetts is part of ISO New England (ISO-NE), an Independent System Operator for an integrated six state power region. ISO-NE manages bulk power and transmission systems within these states.

New England power plants can generate about 25,000 megawatts (MW) of electricity per day. The region can also import up to 4,200 MW from New York, Quebec, and New Brunswick. The transmission system, or power grid, consists of about 7,000 miles of high-capacity electric lines.

In 1998, Massachusetts passed an electrical energy deregulation statute, which has had a significant impact on the power generation market in Massachusetts and the New England region. Existing electric utility companies were strongly encouraged to divest themselves of all generating facilities. Generators were expected to compete for sales to local distribution companies on price. Under deregulation, existing retail utility companies transmit power to retail users



BARGE LAYING
A NATURAL
GAS PIPELINE

to double the capacity of the Mystic and Fore River plants and convert them from oil to gas fired turbines. At the Mystic plant, CZM worked with the owners to identify marine docking facilities, allowing the construction materials to be barged to the site rather than trucked through the streets of Everett. At the Fore River, CZM and other agencies objected to the owner's plan to use large amounts of river water to cool the plant and instead successfully advocated for the use of an air-cooling system.

Another existing power plant at Kendall Square on the Charles River in Cambridge was purchased by Southern Energy (now Murant). Again, plant cooling was a major issue. The applicant proposed an innovative cooling design using a diffuser to spread heated water throughout the Charles River Basin, however many resource agencies are concerned that the heated water will have adverse effects on fish. These agencies, with CZM, are working with the applicant to modify the design to avoid fishery impacts.

REVIEW: NATURAL GAS PIPELINES

The new power plants proposed in Massachusetts are primarily natural gas fired, as this fuel burns more efficiently than oil and has fewer adverse impacts on air quality. To provide fuel to these power plants, new high-pressure gas pipelines are being proposed to bring gas from the fields off the Canadian Maritimes to the New England region. Algonquin Gas Transmission Company has proposed the HubLine, a 29.4-mile long, 30-inch high-pressure gas transmission line to be located in western Massachusetts Bay. The proposed pipeline would interconnect with

Maritimes and Northeast's system at Beverly and would be buried under the sea floor through Beverly Harbor, Salem Sound, Massachusetts Bay, Boston Harbor, and the mouth of the Weymouth Fore River, delivering gas to the Sithe Fore River plant mentioned above. CZM has been particularly concerned about the potential impact of this project on deep-sea shipping, as the proposed route crosses several shipping channels and anchorages. Algonquin has re-designed the project to bury the pipeline by at least 10 feet in areas where ships might anchor or where shipping channels may be dredged below current depths. Another consideration has been the impact of the extensive anchoring system used to steady the barges that lay the pipeline in the water—these anchors affect significantly more of the ocean bottom than the pipeline itself. Algonquin has agreed to use a system of buoys on the anchor lines, which will minimize damage to the ocean bottom.

REVIEW: WIND POWER

Because of improving technology and the requirement that Massachusetts retail electric companies use renewable sources of energy, there is considerable interest in wind power. Cape Wind Associates has proposed a 170-machine wind farm that would generate up to 420 MW of power on Horseshoe Shoals in Nantucket Sound. This project would be the first in the world of this size in the open ocean. The proponents plan to provide power to the New England power grid, offering a source of renewable energy to the region. This project, while outside of state waters, will be reviewed by CZM, as it will affect the Massachusetts coastal zone.

Several other projects are expected to be proposed in the near future including an offshore gas pipeline from Sable Island passing along the continental shelf off Massachusetts to the New York/New Jersey area, and a wind and wave energy project on Nantucket shoals.

FUTURE CONSIDERATIONS

A major constraint on the New England energy market is the condition of the surrounding infrastructure. ISO-NE has identified a shortage of transmission capacity, and has begun a project to improve high voltage transmission lines, both to bring power in from sources outside the region and to improve transmission within the region.

Though new natural gas pipelines will become available, distillate fuels, such as gasoline, jet fuel, and home heating oil, will continue to be transported by ships and barges. A very significant percentage of the storage capacity for these fuels is bridge-bound, meaning that the storage tanks are upstream of often aging bridges. Two bridge repair projects in the Boston area alone have upset regional fuel delivery schedules over the past three years, and the projects are not finished yet. It is important that the state develop an overall plan for repair and replacement of bridges that takes maritime needs into account.

CZM will continue to work with the energy suppliers and generators to ensure that alterations and additions to our badly needed energy system are built in a manner that is consistent with Massachusetts coastal policies.



HYDROPOWER DAM



PETROLEUM TANKER



NATURAL GAS-FIRED
ELECTRICAL GENERATION
FACILITY IN EVERETT

DID YOU KNOW?

Current sources of energy for electric power generation in New England are as follows:

NUCLEAR	24%	COAL	13%
OIL	20%	HYDROELECTRIC	6%
NATURAL GAS	16%	SOLAR/WIND	5%

(The remaining 16% is made up of energy purchased from other states.)

HULL MUNICIPAL
LIGHT COMPANY'S
WIND TURBINE ON
POINT ALLERTON.



Average area wind speeds of 13 mph provide enough energy
to power all of Hull's street and traffic lights
at an ANNUAL SAVINGS OF \$50,000...

REFLECTIONS: IN HULL, THE ENERGY FUTURE IS HERE

By Jane Mead, CZM

On a sunny February afternoon, the occupants of the dozen or so cars parked next to Hull Gut were not as interested in ocean views as they were in this new-fangled machine on the grounds of the high school. Standing 240 feet tall at the tip of its 90-foot blades, the Hull Municipal Light Company's new 660 kW wind turbine is an object of great interest and, from what I could overhear, of admiration. The three-bladed Vestas turbine sitting on top of its 150-foot mono-pile structure was described by on-lookers as "majestic" and "a piece of sculpture."

Average area wind speeds of 13 mph provide enough energy to power all of Hull's street and traffic lights at an annual savings of \$50,000, and there is electricity left over to contribute to the power grid. The wind turbine replaces a 40 kW turbine that operated on the site for 10 years, before it was damaged in a storm in 1995 and taken out of service. The new machine incorporates design features that make it stronger. Birds can't roost on the mono-pile structure and the

slowly rotating blades are easy for birds to see and avoid. There is a slight downwind sound from the turning blades.

I'm not sure if the

residents on the other side of the school can hear it, though the faint rhythmic whooshing might be very soothing. And, of course, there is no air, water, or soil pollution to clean up.